DEVELOPMENT OF A STANDARDIZED PROCEDURE FOR CAPSAICIN QUANTIFICATION IN AEROSOLIZED CROWD CONTROL DEVICES

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BRIEF DESCRIPTION

Lamperd Less Lethal are the creators and manufacturers of less lethal technology and ammunition, including pepper spray. Currently there are guidelines for the potency of pepper spray but no rules or laws to measure what amount a person would be exposed to if a pepper spray device was deployed. The "heat" of pepper spray is measured in Scoville Heat Units (SHU), and is the total of capsaicin and related capsaicinoids (CRCs) present. Pepper spray for law enforcement use should be <200,000 SHU.

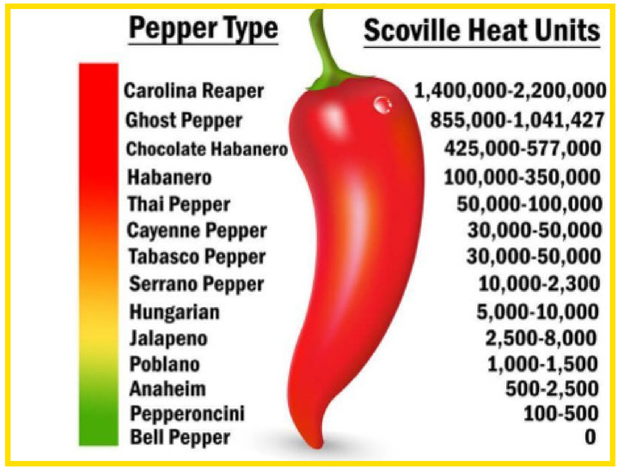

FIGURE 1: THE SCOVILLE HEAT UNITS OF COMMON PEPPER TYPES.

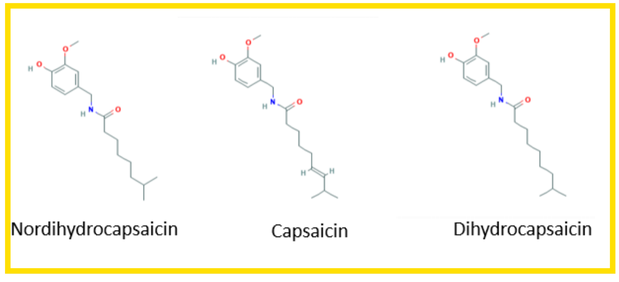

FIGURE 2: THE TOTAL AMOUNT OF CAPSAICIN AND RELATED CAPSAICINOIDS (NORDIHYDROCAPSAICIN AND DIHYDROCAPSAICIN) CONTRIBUTE TO HOW HOT A PEPPER WILL BE.

PROJECT GOAL

To deploy pepper spray provided by Lamperd and measure the amount of CRCs a person would be exposed to if they were present within the pepper cloud vicinity.

METHODOLOGY

1. Characterize pepper cloud

Figure 3&4. Lamperd's pepper spray will be deployed and dust sampling pumps and filters will be set up within the pepper cloud range. Knowing the volume of air the pump will draw in, the amount of CRCs in the air can be calculated.

2. Quantify CRCs

Figure 5. High Performance Liquid Chromatography is used to separate and quantify the amount of CRCs drawn into each filter.

FIGURE 3

FIGURE 3 & 4: LAMPERD'S PEPPER SPRAY WILL BE DEPLOYED AND DUST SAMPLING PUMPS AND FILTERS WILL BE SET UP WITHIN THE PEPPER CLOUD RANGE. KNOWING THE VOLUME OF AIR THE PUMP WILL DRAW IN, THE AMOUNT OF CRCS IN THE AIR CAN BE CALCULATED.

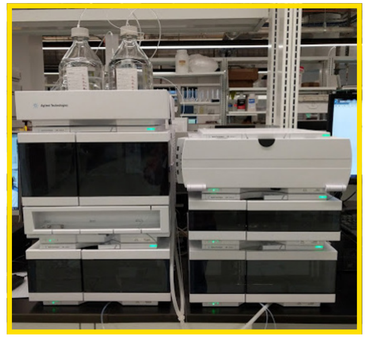

FIGURE 5: HIGH PERFORMANCE LIQUID CHROMATOGRAPHY IS USED TO SEPARATE AND QUANTIFY THE AMOUNT OF CRCS DRAWN INTO EACH FILTER.

RESULTS

Determination of Scoville Heat Units	SHU = [(C+D)*16.1] + (N*9.3) where C,D,&N are in mg/kg

FIGURE 6: THE TOTAL SHU THAT A PERSON IS EXPOSED TO WHEN PEPPER SPRAY IS DETONATED, IS CALCULATED BY THE ABOVE FORMULA

Compound	mg/ml	mg of CRC	kg of sample	mg/kg
N	0.01067	0.0533	0.0000243	2194
C	0.15067	0.7533	0.0000243	31001
D	0.09467	0.4733	0.0000243	19479

SHU = [(C+D)*16.1] + (N*9.3)
= [(31,001+19,479)*16.1] + (2,194*9.3)
= 365,017 SHU

FIGURE 7: CALCULATED SHU OF RAW PEPPER SPRAY PRODUCT PRIOR TO DEPLOYMENT. THIS IS MUCH HIGHER THAN THE TARGET AND SHOULD BE PREPARED AT A LOWER CONCENTRATION TO MEET THE <200,000 SHU REQUIREMENT FOR LAW ENFORCEMENT USE.

Partner:
LAMPERD LESS LETHAL™
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